Critical Success Factors for Deploying and Implementing Lean Six Sigma

U. S. Army Materiel Command

2005 Senior Executive Training Symposium

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Workshop

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Air Academy Associates

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Key Take-Aways

- Quick Recap of What and Why of Lean Six Sigm
- What are the Critical Success Factors
- Questions Leaders Need to Ask
- Roles and Responsibilities of Key Players
- Leading and Managing Change
- Lessons Learned

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What is Lean Six Sigma?

- Customer-Focused Change Strategy
- Leadership Driven
- Powerful Methodology
- Empowered Teams
- Best Tools
- Accelerated Business Results

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Lean Six Sigma Goals and Benefits

- **Achieve total customer satisfaction and improved operational effectiveness and efficiency**

  - Remove wasteful/non-value added activities

  - Decrease defects and cycle time, and increase first pass yields

- **Improve communication and teamwork through a common set of tools and techniques (a disciplined, repeatable methodology)**

- **Develop leaders in breakthrough technologies to meet stretch goals of producing better products and services delivered faster and at lower cost**

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Why Lean Six Sigma? ROI

TRAINING	DEPLOYMENT: Quality Initiative	DEPLOYMENT: Business Strategy
Knowledge Based Approach (A Pull System for Tools)		Highest * ROI (2%)
Heavy Statistics Based Approach (A Push System for Tools)	Lowest* ROI (0.2%)	

* Based on a meta-study of 23 companies using Lean Six Sigma for at least 2 years.

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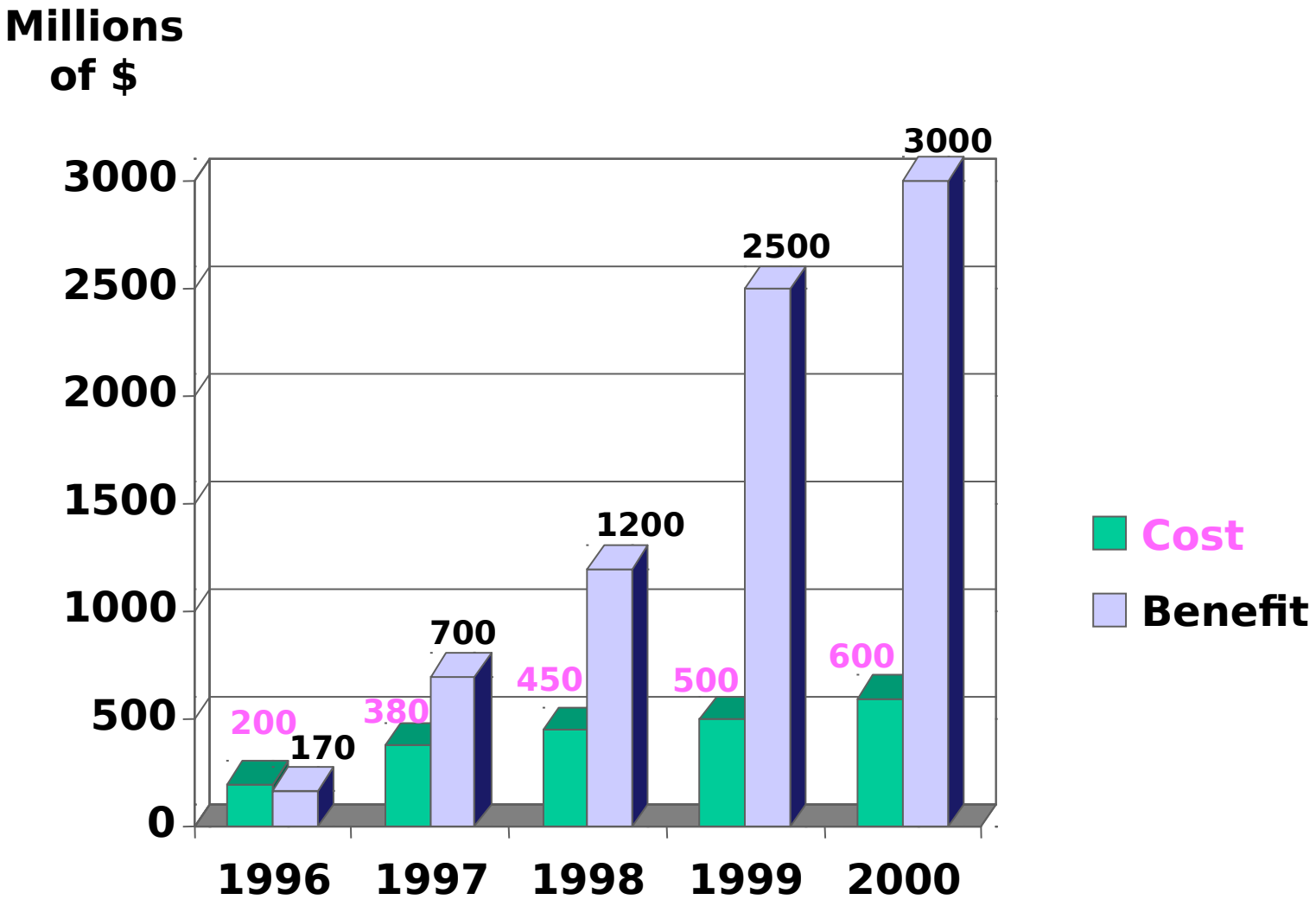
GE's ROI



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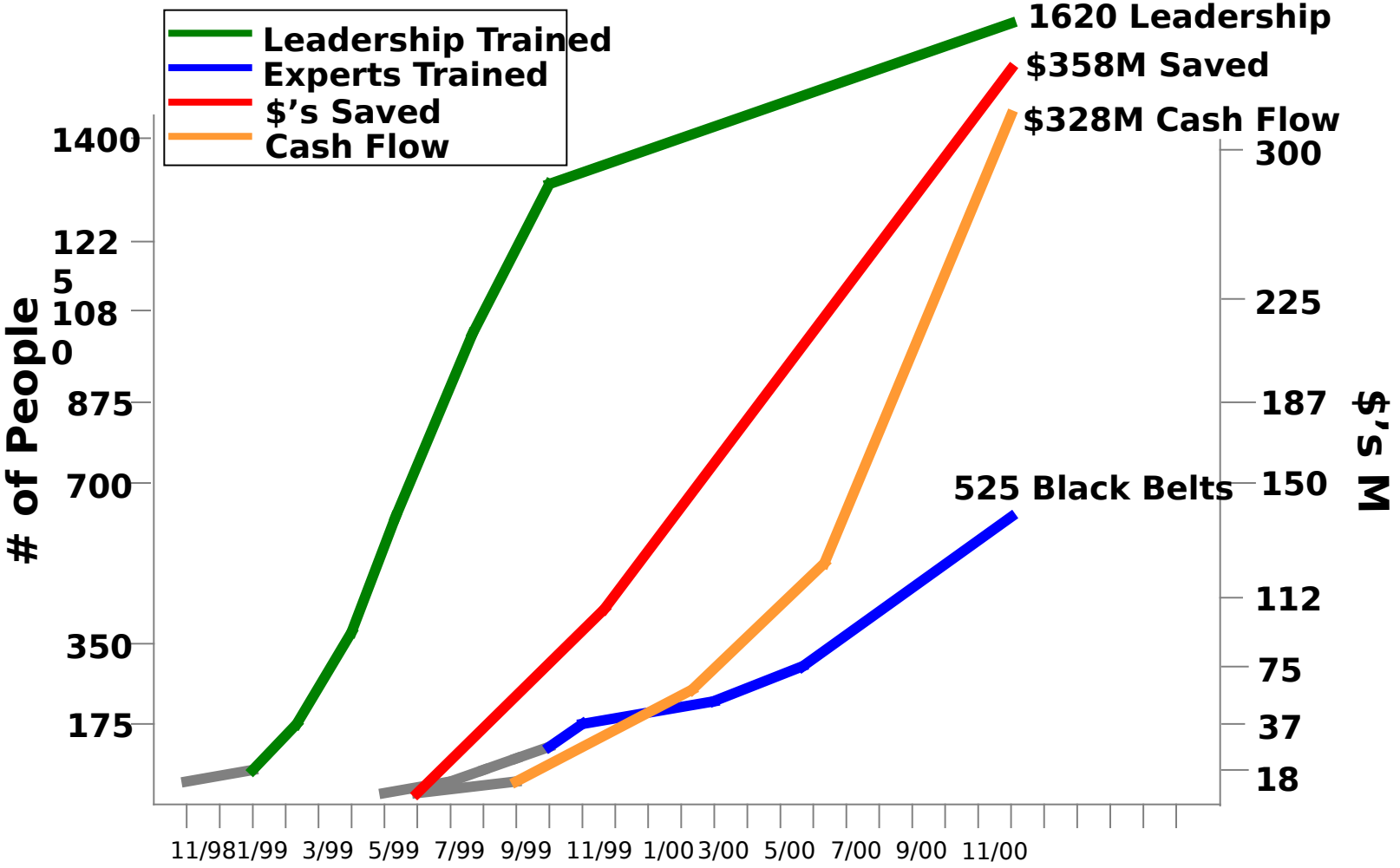
Raytheon's Savings



The first 24 months of Savings is $358 M (Total 2000 - $256 M)
With $328 M of Cash Flow improvement (Total 2000 - $288 M)
(Year End 2000 Certified 139 Black Belts)

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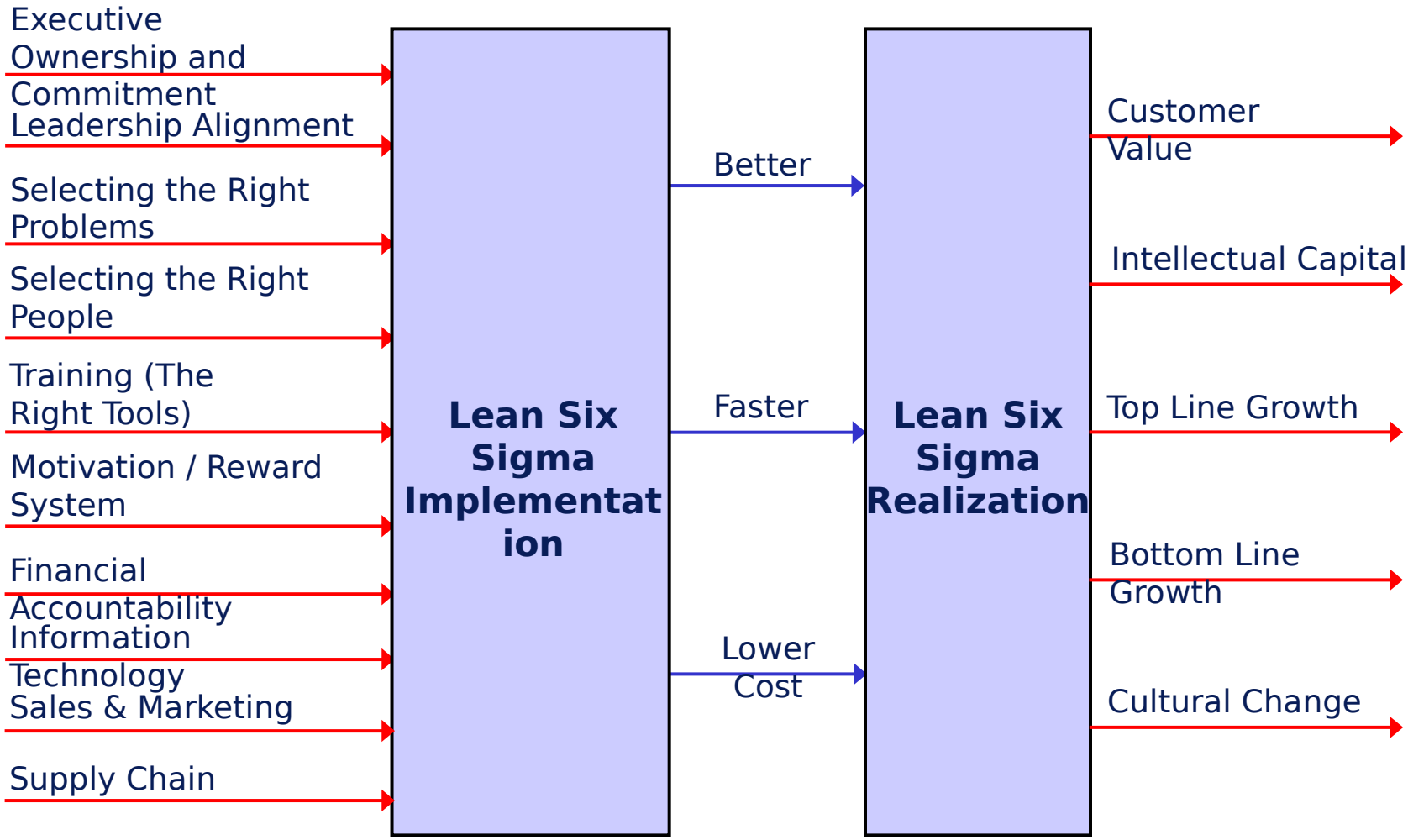
Critical Success Factors



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Lean Six Sigma Infrastructure

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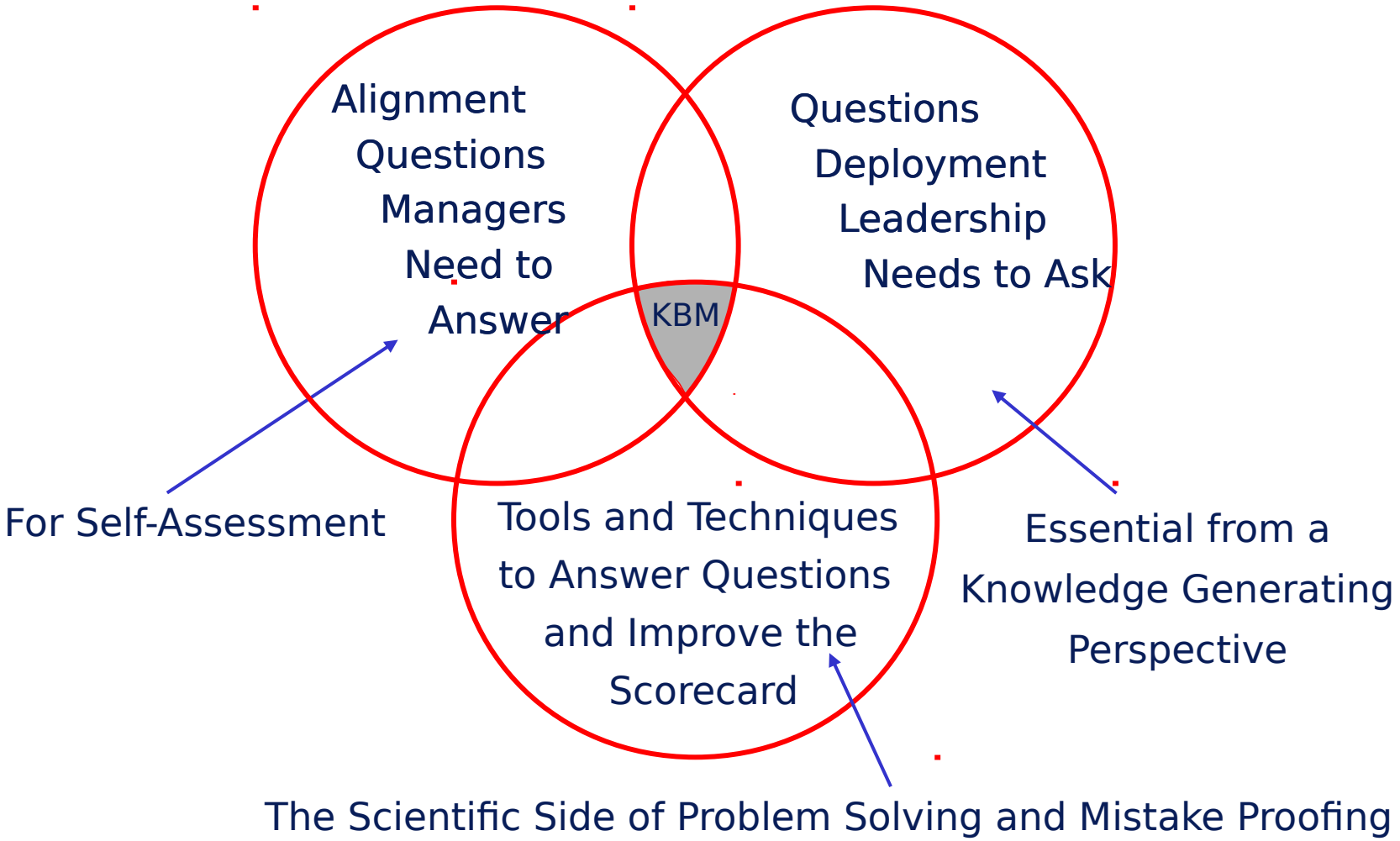
Key Ingredients to a Knowledge Based Pull System for Delivering Value


Alignment Questions Managers Need to Answer
Questions Deployment Leadership Needs to Ask
KBM
For Self-Assessment
Tools and Techniques to Answer Questions and Improve the Scorecard
Essential from a Knowledge Generating Perspective
The Scientific Side of Problem Solving and Mistake Proofing

Note: KBM = Knowledge Based Management

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Alignment Questions Leaders Need to Answer

1. What are your products and services and who are your customers? Do you know the value proposition for each customer?

2. What perceptions do your customers have of your products and services? How do you know? Are you asking your customers the right questions?

3. Do you believe that waste and quality issues are important to your company? Why? Which ones?

4. What is your company's current share of the total market? Can improvement efforts assist you in increasing the market share and/or increasing profits? How?

5. Are you actively pursuing breakthrough as well as continuous improvement in your areas of responsibility that link to customer value? How?

6. How many hours per week have you actually spent over the last three months and how many hours per week do you currently have scheduled on your calendar that are devoted strictly to the removal of waste and variation?

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Alignment Questions Leaders Need to Answer (cont.)

7. How often per week do you solicit feedback from the people you manage? What kind of feedback do you solicit? What do you do with the feedback?

8. What are the right knowledge-generating and improvement-oriented questions managers need to ask their people? What methods or tools can be used to answer them?

9. Have you deployed and implemented an improvement strategy with a disciplined methodology and toolset and associated infrastructure to predictably generate bottom-line results?

10. Are your people properly trained to successfully use the latest and best improvement methodologies and tools? What is your Return on Investment (ROI) from the training? Do you have a standard procedure for documenting the improvement efforts and results? What is it?

11. What barriers do your people face when trying to improve the way your company does business? What are you doing to remove these barriers?

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Alignment Questions Leaders Need to Answer (cont.)

12. On what measures of performance that relate to these issues are you evaluated? Are you held accountable for these metrics? What are the specific improvement goals for them?

13. How much waste does your company have? That is, what is the company's Cost of Waste or Cost of Poor Quality, both in raw currency amounts and also in percent of revenue? Is it getting better, staying the same, or getting worse? How much of that waste exists or originates in your area of responsibility?

14. Do you have a plan that will, one year from now, show evidence that you made a difference? And what do you predict that evidence will show?

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Questions Leaders Need to Ask

Strategy

Define

1. **Which value stream are you supporting and who is the recipient of the value, i.e., who is the customer? Who is the value stream owner and who are the players or team members? How well does the team work together?**

2. **Within the value stream, which process or processes have the highest priority for improvement? Show me the data that led to this conclusion.**

For the process or processes targeted for improvement,

Measure

3. **How is the process performed? How does the value flow? What activity is value added and what is non-value added?**

4. **What are the process performance measures, i.e., how will we gauge if a process is improving? Why did we choose those? How accurate and precise is the measurement system? Show me the data.**

5. **What are the customer-driven requirements or specifications for all of the performance measures? Are the process performance measures in control and how capable is the process? Show me the data. What are the improvement goals for the value stream or process performance measures?**

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Questions Leaders Need to Ask (cont.)

Strategy

Analyze

6. **What kinds of waste and cost of poor quality exist in the value stream or process and what is the financial and/or customer impact? Show me the data.**

7. **What are all the sources of variability in the value stream or process and which of those do we control? How do we control them and what is our method of documenting and maintaining this control? Show me the data.**

8. **Are any sources of waste or variability supplier-dependent? If so, what are they, who are the suppliers, and how are we working together to eliminate waste and variability? Show me the data.**

9. **What are the key input variables that affect the average and standard deviation of the measures of performance? How do you know this? Show me the data.**

10. **What are the relationships between the measures of performance and the key input variables? Do any of the key input variables interact? How do you know for sure? Show me the data.**

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Questions Leaders Need to Ask (cont.)

Strategy

Improve

11. **What settings or values for the key input variables will optimize the measures of performance? How do you know this? Show me the data.**

12. **For the optimal settings of the key input variables, what kind of variability still exists in the performance measures? How do you know? Show me the data.**

Control

13. **Have we implemented a process flow and control system to sustain the gains and continuously improve the process? Show me the data.**

14. **How much improvement has the value stream or process shown in the past six months? How much time and/or money have our efforts saved the company? Show me the data.**

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Lean Six Sigma: Some of the Key Players

- **Champions (Business Mentors, Owners, Sponsors)**
- **Black Belts (Experts)**
- **Green Belts (Specialists)**
- **Master Black Belts (Masters of the Lean Six Sigma Process, Technical Mentors, Internal Trainers and Consultants)**

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Comparison of Roles

	CHAMPION (Mentor)	BLACK BELT (Expert)	GREEN BELT (Specialist)	MASTER BLACK BELT (Master)
PROFILE	• senior manager • respected leader and mentor of business issues • strong proponent of Lean Six Sigma who asks the right questions • serves as a business mentor for Black Belts	• respected by peers and management • master of basic and advanced tools • able to turn data into information	• respected by peers • proficient in basic and advanced tools • able to turn data into information	• technically excellent in the knowledge and application of Lean & statistical tools • excellent communicator • respected Lean Six Sigma role model at all levels of the company
ROLE	• provide resources and strong leadership for projects • inspires a shared vision • establishes plan and creates infrastructure • develops metrics • converts gains into $ • may serve on Lean Six Sigma Leadership Team	• leads strategic, high impact process improvement projects • change agent • teaches and mentors cross-functional team members & Green Belts • full-time project leader • converts gains into $	• leads important process improve- ment teams • leads, trains and coaches on tools and analysis • assists Black Belts • typically part-time on a project	• technical mentor for Lean Six Sigma Black Belts and Green Belts • internal consultant and trainer of L. Six Sigma • generates breakthrough thinking for improving Lean Six Sigma process • serves on Lean Six Sigma Leadership Team
TRAINING	• 3 days of Champion training • Lean Six Sigma development and implementation plan	• four or five 1-week sessions with three to six weeks in between to apply • project review in every session	• two 1-week sessions with one month in between to apply • project review in 2nd session	• 1-2 weeks of Train-the-Trainer and/or Advanced Courses in Lean and Six Sigma (TTT, MBB, Lean, DFSS)
NUMBERS		• 1 per 50 to 100 employees (1 - 2 %)	• 1 per 20 employees (5%)	• approximately 10% of the number of Black Belts

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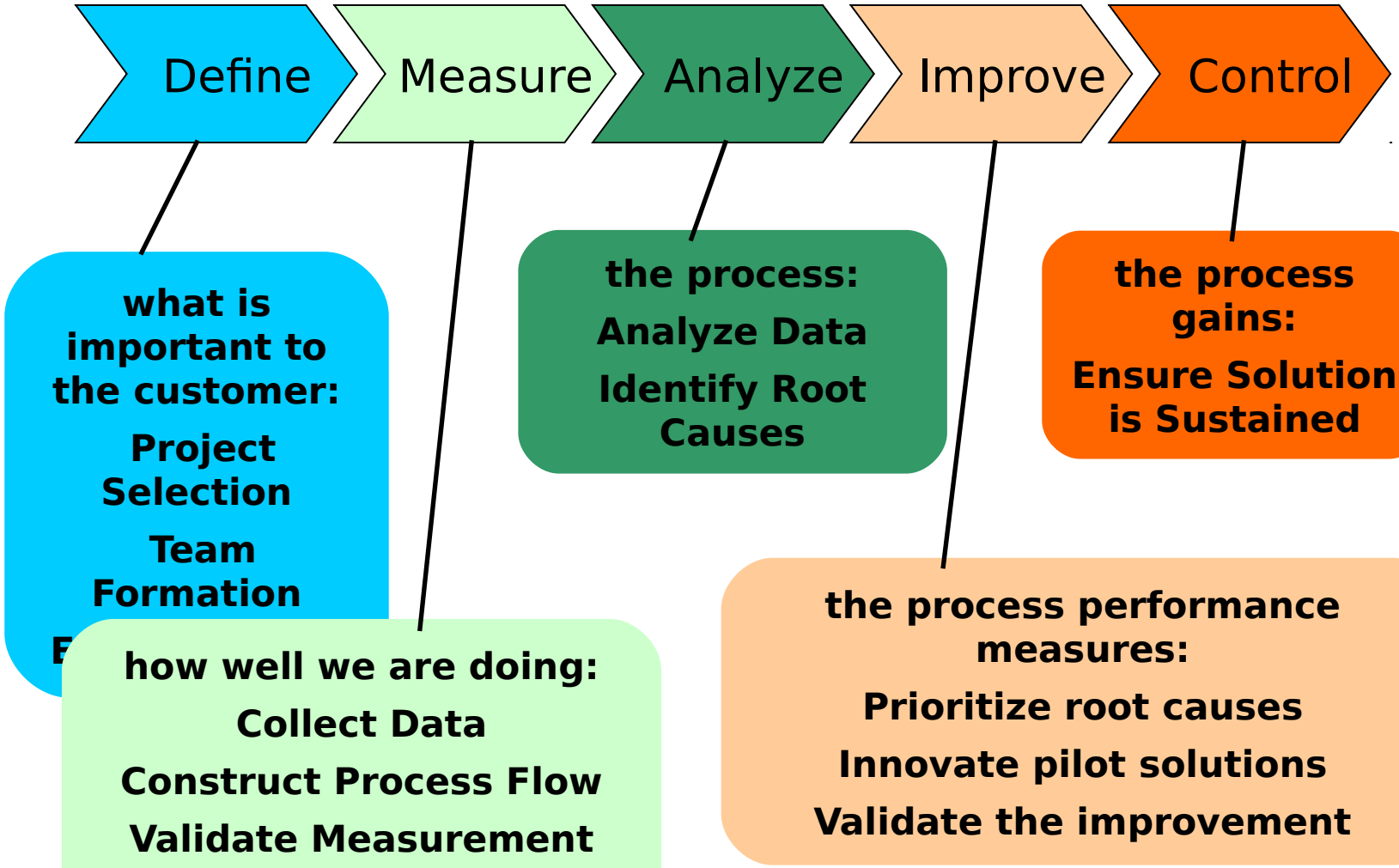
Lean Six Sigma: A Powerful Methodology (DMAIC)



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Lean Six Sigma: Enhancing A Business Strategy

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Lean Six Sigma Deployment Roles

Champions:

- **Believe in the need for change, create the vision, and provide resources**
- **Authorize, legitimize, and possess ownership of the change**
- **Trained in Lean Six Sigma philosophies and methodologies**
- **Highly visible, top-down commitment to Lean Six Sigma Development goals**
- **May Serve on the Lean Six Sigma Leadership Team**

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Lean Six Sigma Deployment Roles (cont.)

Champions:

- **Assume a mentorship role for Lean Six Sigma Black Belts to include:**

  (1) Identifying key business areas where breakthrough technologies can best benefit the organization.

  (2) Identify Black Belt candidates in accordance to selection criteria.

  (3) Provide financial and organizational resources to train and equip Black Belts to identify and accomplish stretch goals.

  (4) Agree on metrics to manage and track progress.

  (5) Recognize and reward success.

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Lean Six Sigma Deployment Roles

Black Belts:

- **Assist management in identifying key business issues to:**

  (1) measure
  (2) set stretch goals
  (3) improve
  (4) document
  (5) transfer

- **Lead Lean Six Sigma projects on a full-time basis**
- **Take charge in areas of needed improvement identified by their Champion**
- **Provide leadership within their area of expertise plus the use of Lean Six Sigma philosophies and methodologies**
- **Stimulate management thinking**
- **Promote out-of-the-box and critical thinking**

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Six Sigma Deployment Roles (cont.)

Black Belts (cont.):

- **Challenge old ways of doing business for purpose of developing new breakthroughs**
- **Be a change agent**
- **Motivate others to set and accomplish stretch goals using Lean Six Sigma philosophies and methodologies**
- **If Green Belts are developed, Black Belts will teach, consult, and mentor them**

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Characteristics of Lean Six Sigma Professionals

- Highly respected by superiors, peers and subordinates
- Understands the “big picture” of the business
- Emphasizes results and bottom line
- Speaks the language of management (money, time, organizational dynamics, etc.)
- Committed to do whatever it takes to excel
- Sponsored by a V.P., Director of Business Unit Manager
- Expert in specific field
- Excellent written and verbal communicator
- Inspires others to excel
- Challenges others to be creative
- Capable of consulting, mentoring, and coaching
- Leads change by challenging conventional wisdom, developing and applying new methodologies, and creating innovative strategies
- Creative, critical, out-of-the box thinker
- Allows room for failures and mistakes with plan to recover
- Accepts responsibility for choices
- Responds well to criticism

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Characteristics of Lean Six Sigma Professional (cont.)

- Encourages commitment, dedication and teamwork
- Unites a team to a core purpose
- Able to communicate all sides of an issue
- Solicits diverse ideas and viewpoints
- Empathizes
- Works on win-win solutions
- Disagrees tactfully, does not overreact
- Acts decisively under pressure
- Anticipates and confronts problems early and corrects causes
- Effectively identifies priorities from a business standpoint
- Manages limited resources in a highly efficient and effective manner
- Careful not to overtask any team member
- Understands people limitations
- Displays a genuine concern about others
- More concerned about business success than personal gain
- Does not lord his/her expertise over others
- Recognized by his/her results instead of title

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Lean Six Sigma Deployment Roles

Green Belts:

- **Lead important process improvement projects which are typically lesser in scope than BB projects**
- **Proficient in the basic LSS tools and some of the advanced techniques**
- **Lead, train, and coach teammates on tools and analysis**
- **Assist BBs on projects to leverage utilization of BBs and MBBs**
- **Take charge in areas of needed improvement identified by Champions, MBBs, and BBs**
- **Typically part time on a project**

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Lean Six Sigma Deployment Roles

Master Black Belts:

- **Perform roles of the Black Belt plus the following:**

  (1) serve on Lean Six Sigma Leadership Team

  (2) mentor Black Belts and Green Belts

  (3) serve as internal consultants and trainers of Lean Six Sigma philosophies and methodologies

  (4) generate breakthrough thinking on how to improve the Lean Six Sigma process

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Lean Six Sigma Deployment Roles (cont.)

Lean Six Sigma Leadership Team:

- Trained in Lean Six Sigma
- Develop a Lean Six Sigma Master Plan to accelerate Six Sigma performance
- Work with management sponsors to identify Lean Six Sigma Black Belt candidates
- Develop a focused curriculum
- Schedule training
- Identify Champions

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Lean Six Sigma Deployment Roles (cont.)

Lean Six Sigma Leadership Team (cont.):

- Serve as mentors for Black Belt candidates
- Determine certification requirements
- Certify Lean Six Sigma Black Belts
- Work with management sponsors on reward system and propagating success stories
- Develop a Lean Six Sigma Network to enhance communications
- Review and improve the Lean Six Sigma Process
- Monitor project selection and progress

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Project Selection

"Within the value stream, which process(es) have the highest priority for improvement? Show me the data that led to this conclusion."

- **"Burning Issues"**
- **Cost of Poor Quality (COPQ) Analysis**
- **Inventory Costs**

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Burning Issues

- Customer demands / complaints
  - Delivery times are too slow
  - Costs are too high
  - Too many failures in product(s)
- Response to competitor gains
- “Urgent” business needs
  - Expenses are too high
  - Erosion of customer base
- Shareholder requirements
  - Quarterly goals, end-of-year goals, etc.
- Excessive warranty costs
- Community/society interests
- Management “intuition”

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Cost of Poor Quality Analysis

Where Does the Cost of Poor Quality (Waste or Muda) Come From? ...

Internal Failure Costs (incurred prior to reaching customer)

External Failure Costs (incurred after reaching customer)

Appraisal Costs

Prevention Costs

Lost Opportunity Costs

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Inventory Costs

- Storage/Warehouse
- Transportation
- Handling
- Obsolescence
- Taxes
- Insurance
- Damage
- Lost Opportunity

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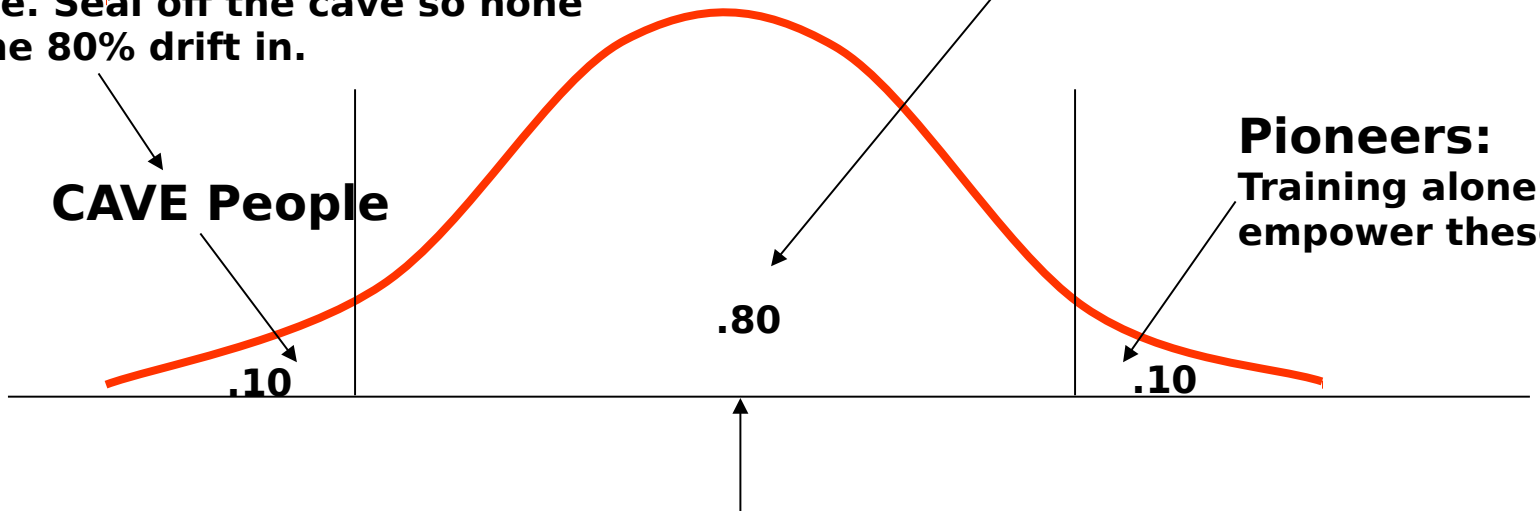
The Normal Distribution and Readiness for Change

CAVE People:
Nothing in the world will empower these. Seal off the cave so none of the 80% drift in.

Settlers:
Training alone will <u>not</u> empower the

Pioneers:
Training alone ca
empower these.



To move an organization forward,
management must act on these,
setting/declaring expectations and
aligning the rewards and

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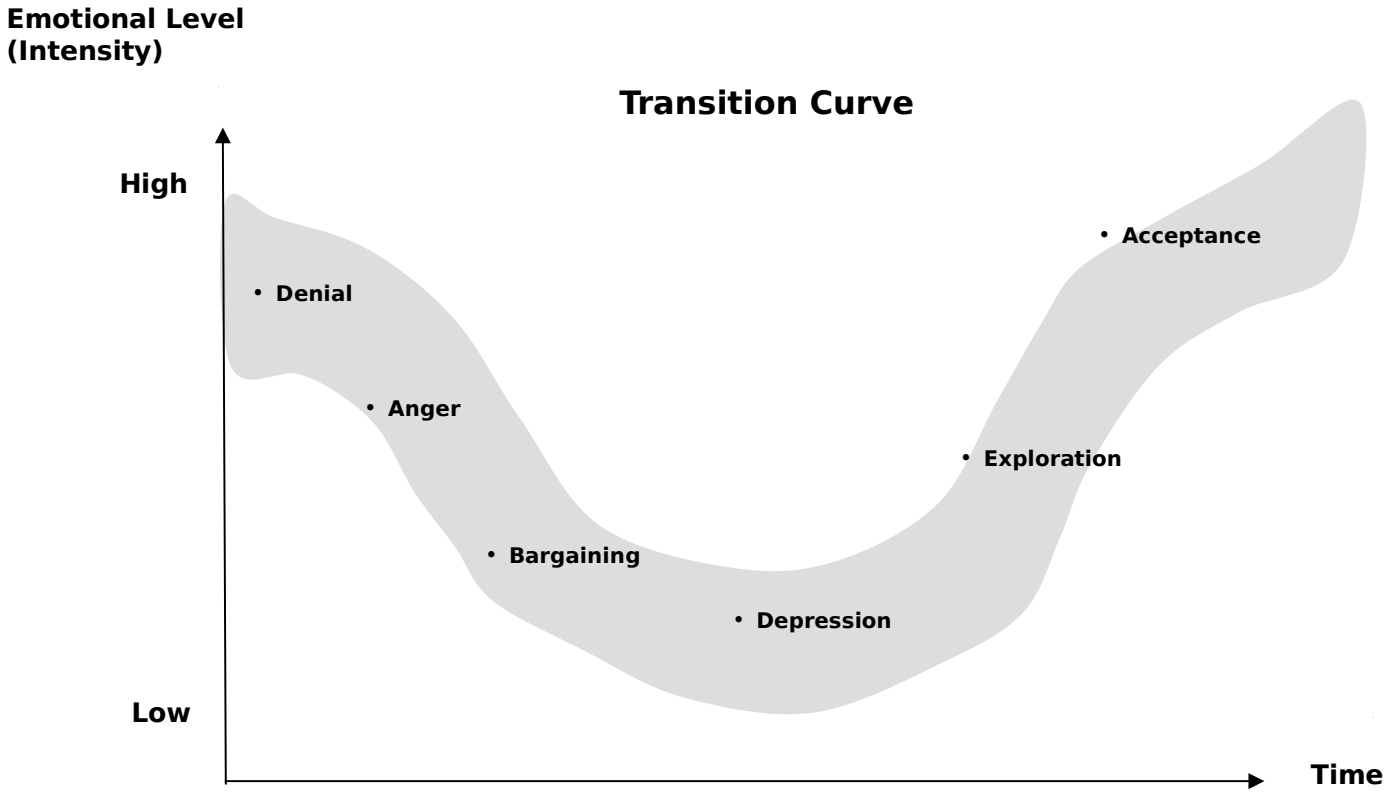
Reactions to Change

- What are some normal reactions to change?



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Key Ingredients for Successful Change

DD + VF + FS > R *

DD = Degree of Dissatisfaction

VF = Vision for the Future

FS = First Steps

R = Resistance

* *Change Model used with permission from Kelly and Frank Petrock.*

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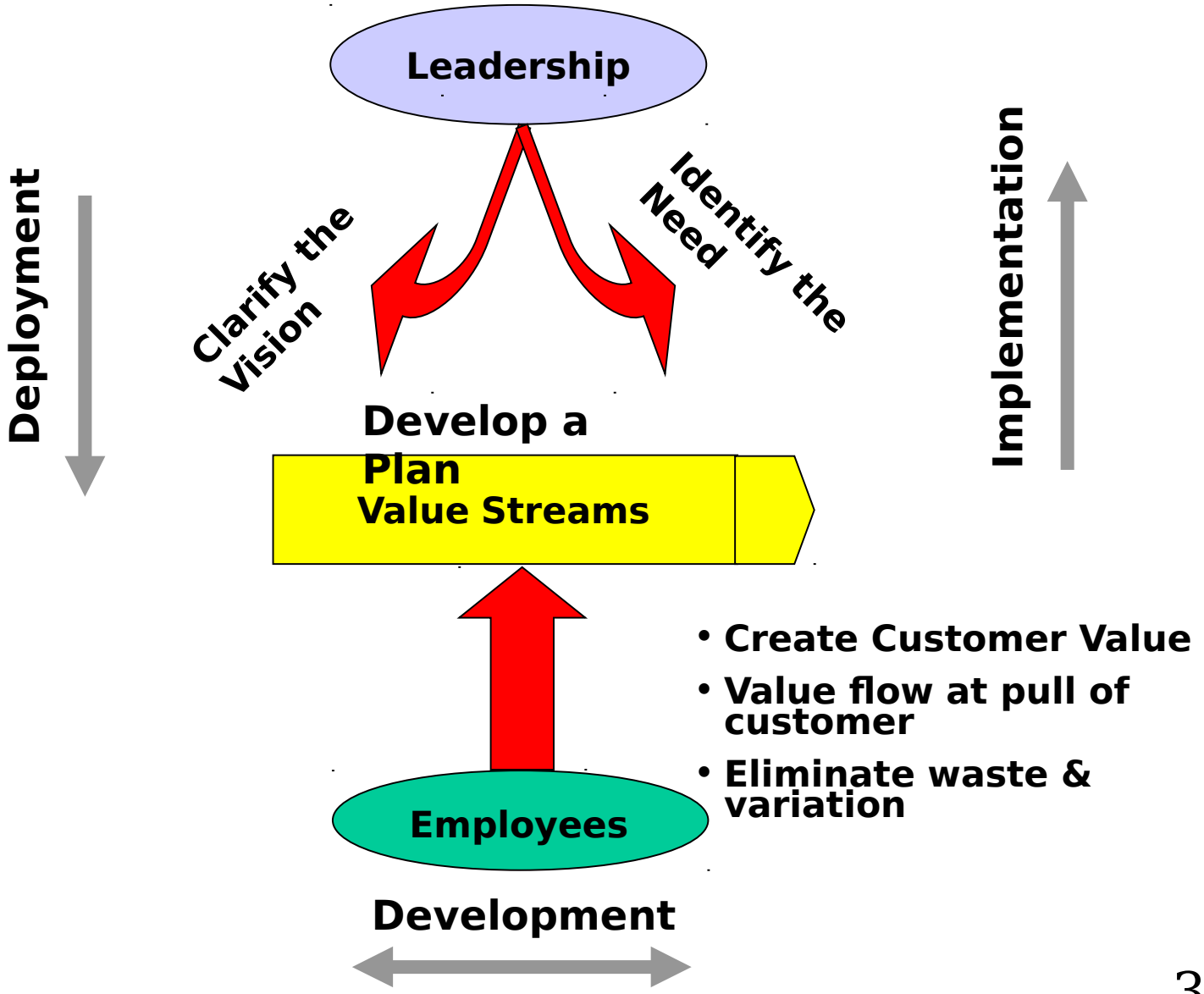
Leadership Drives Change



- Create Customer Value
- Value flow at pull of customer
- Eliminate waste & variation

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Lean Six Sigma Requires Behavioral Change

- **Lean Six Sigma Challenges Us to:**
  - **Think Differently**
  - **Work Differently**
  - **Ask Questions and Challenge the Status Quo**
  - **Make Decisions With Facts and Data**
  - **Use New Principles, Tools and Methodologies**

"Early-on, when culture and change compete, culture wins."
- Tom Quan, GlaxoSmithKline

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Change Management

Critical Questions to Consider in Order to Manage Change

1. What are the normal reactions to change?
   Denial - Anger - Bargaining - Depression - Exploration - Acceptance

2. Why do people resist change?

3. Why do some people openly embrace change?

4. Is change always necessary?

5. What are the key ingredients for successful change?
   Need - Vision - Plan

6. How do we manage the three ingredients in Question 5?

7. How can successful change be sustained?

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6 Major Points a Change Agent Must Remember

1. What's In It For Me (WIIFM)?

2. Organization's Status?
   a. Company in Crisis
   b. Market Leader
   c. Middle-of-the-Pack

3. Organization's Tradition / Experience with Change

4. Incremental vs. Breakthrough Change

5. Show Me the Data!
   - COPQ / COW
   - Trend Data
   - Benchmarking
   - Benefits of Change

6. Trumpet Our Successes (as a result of change)

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Reasons for Change Effort Failing

	% of Sample
• Desired performance or behavioral change was not successfully linked to the change initiative	84%
• Employees at all management levels were given unclear roles and accountabilities	63%
• There was a general lack of understanding about the need for change throughout the organization	50%
• There was inadequate organizational commitment to the change effort	50%

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Sample size = 200 companies

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Reasons for Change Effort Failing

- **Underestimating the Sense of Urgency for Change**
- **Failing to Create a Sufficiently Powerful Core of Committed Change Agents**
- **Underestimating the Power of Vision**
- **Undercommunicating the Vision**
- **Permitting Obstacles to Block the New Vision**
- **Failing to Achieve Quick Successes**
- **Declaring Victory Too Soon**
- **Failing to Anchor Change firmly into the Culture**

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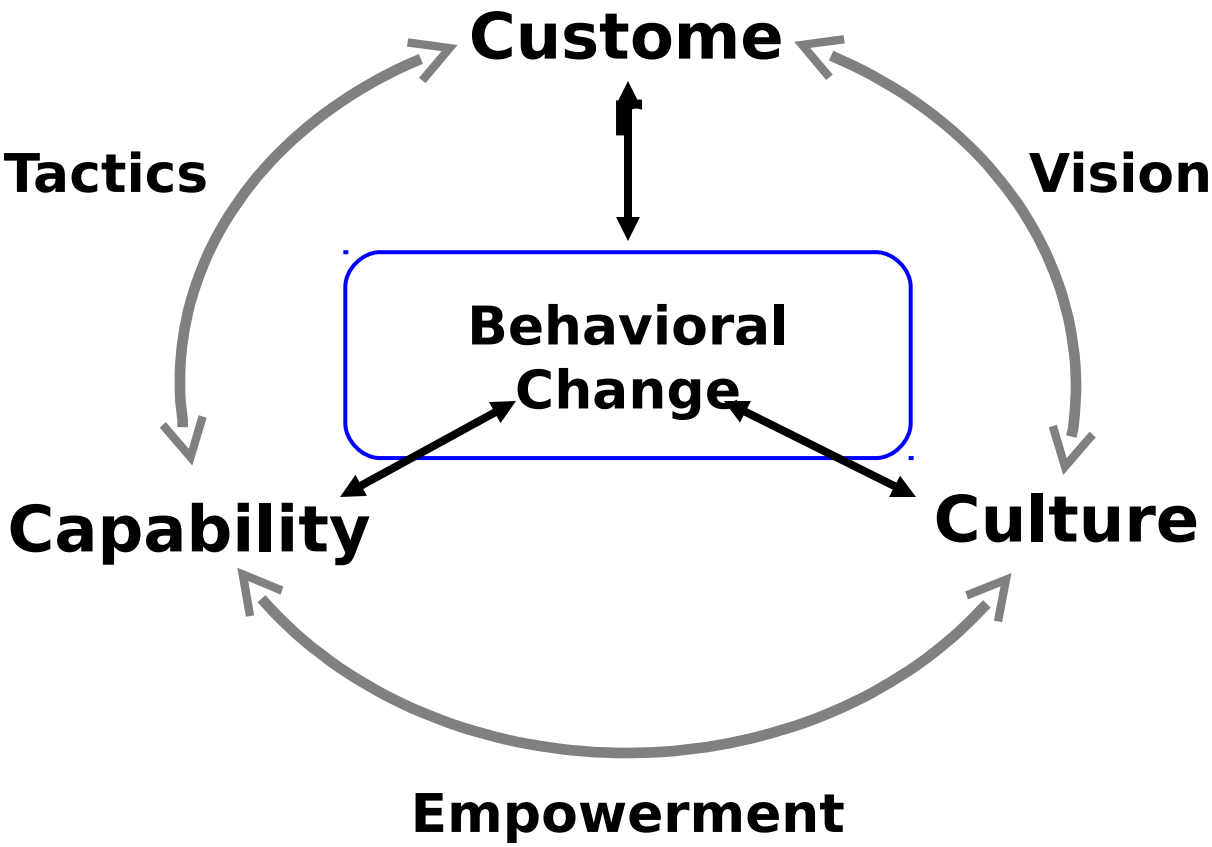
Interaction of Customer, Capability, and Culture



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Lessons Learned

- Emphasis on measurable, auditable bottom-line results
- Executive Ownership
- Building a corporate infrastructure to align leadership and enhance bottom-line results
- Financial accountability with finance involvement in computing ROI
- Emphasis on both continuous and breakthrough improvement
- Project selection based on key business issues
- Selecting our best people to execute projects
- Motivation and reward system based on performance
- Constant communication corporate wide about the need, vision, and plan for Lean Six Sigma
- Constant focus on results and sharing of successes

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To Successfully Deploy Lean Six Sigma

- Start with the customer … listen, listen, listen
- Leadership commitment and alignment … go beyond the words … change behavior
  - Create momentum for change
  - Develop need, vision and plan
  - Communicate, communicate, communicate
  - Repeatedly execute and assess
  - Develop necessary skill sets to obtain the desired future state at all levels of the organization
    - Leadership, Champion, Black Belt, Green Belt, Master Black Belt

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To Successfully Implement Lean Six Sigma, remember to…Keep It Simple and Straightforward

- Select a process in the value stream …
- Determine what to measure and develop an IPO for the process
  - → Output { Accuracy, Timeliness, Cost } ⇒ Critical-to-Customer
  - → Input - Sources of variation
- Flow out / map the process (PF) …
- Create a CE diagram …
- Collect data
- Develop appropriate control charts and monitor
- Prioritize and select a project (directed against a measure)
- Improve the process systematically
- Develop a new process flow and control system
- Monitor the process to sustain the gain

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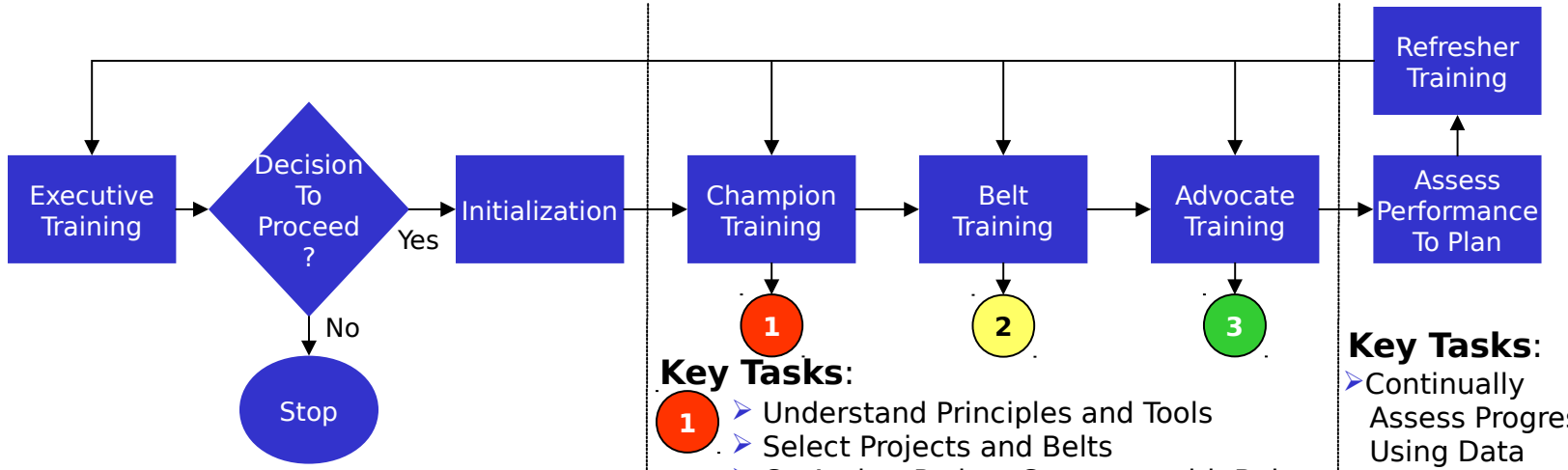
Synchronizing Lean Six Sigma to Business



Key Tasks:

- Understand Principles and Tools
- Appreciate Cost of Poor Quality (COPQ)
- Decide to Invest in Six Sigma (Yes/No)
- Integrate Six Sigma Into Existing Business Improvement Initiatives
- Appoint Corporate Champion
- Commission Steering Committee
- Author Deployment Plan
- Establish Goals and Metrics
- Realign Compensation To Goals
- Initialize Finance, HR and Other Core Functions
- Communicate Decision to Proceed to Workforce

Key Tasks:

1
- Understand Principles and Tools
- Select Projects and Belts
- Co-Author Project Contracts with Belt
- Provide Continuous Project Updates
- Serve as "DMAIC" Gatekeeper for Project; Establish Stretch Goals
- Provide Resources for Project Success
- Ensure Timely Benefit Realization
- Mobilize Interest and Commitment

2
- Complete Project IPO Diagram
- Learn, Practice and Apply the Tools from Belt Training
- Adhere to the DMAIC Project Roadmap
- Manage the Project Per the Contract
- Provide Continuous Project Updates
- Complete Knowledge Notebook for Project
- Ensure Timely Project Closeout, Benefit Realization and Team Recognition

3
- Learn What Six Sigma is and How to Get Involved

Key Tasks:

- Continually Assess Progress Using Data
  - Project Selection
  - Project Execution
  - Benefit Capture
  - Belt Performance
  - Deployment Planning
  - Overall Performance
- Revise Deployment Plan As Appropriate
- Amend Training As Appropriate
- Provide Refresher Training As Appropriate

Initialization — *Execution* — *Assessment*

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Summarizing the Power of Lean Six Sigma

- **Provides a *world class* business strategy**
- **Encourages a *common vision* and *common language* shared by all**
- **Promotes *teamwork* and REWARDS success**
- **Combines *aggressive goals* with a *method* and a set of *tools***
- **Requires the *application* of *tools* throughout *entire lifecycle* of a product or service**
- **Produces knowledge for *improved cycle time*, *reduced defects*, and *lower cost***

***Better* products and services**
delivered *faster and* at *lower cost*
=
Improved War Fighting Capability

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